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CLIENT: KNIGHTS INN

LOSS ADDRESS: 1121 9th Avenue SW, Bessemer AL. 35023

DATE OF LOSS: MARCH 22, 2014

DATE OF REPORT: AUGUST 10, 2015

EXPERT REPORT OF THOMAS J. IRMITER

This will serve as my expert report regarding the scope of the loss and required scope of repairs at the Knights Inn Buildings located at 1121 9th Avenue SW, Bessemer AL 35023. These repairs are required because of a fire, which occurred on March 22, 2014 hereinafter, referred to as ("the property damage loss").

I. Summary of Opinions

The following are my opinions regarding the scope of repairs and the property damage loss. The basis and reasons for these opinions, the data, and other information that I considered in forming these opinions, are identified in Sections IV, V and VI of this report.

A. Based on the site inspection and documentation of the damages conducted by Forensic Building Science (FBS), including review of the results of our soot sampling, I have concluded that the property in question located at 1121 9th Avenue SW, Bessemer AL 35023 has been damaged by fire and deposition of soot throughout the structure. Based on the sample results, and the type of construction in the building, it is my opinion that the fire caused substantial damage to the building through the deposition of carcinogenic soot into hidden wall, ceiling and floor cavities. This soot is still viable in the ambient air as evidenced by our sampling results. Water used to extinguish the fire contributed to fungal growth. Damage to the concrete slab at the cause and origin location swill require replacement of the slab. Soot in the open cell CMU block and the unit separation walls will require complete demolition of these walls to remove the soot.

Until this soot is removed by proper remediation techniques, any activation of HVAC equipment or simple movement of exterior airflow through the buildings numerous open bypasses will continue to release the soot into the ambient air.

B. It is my opinion that removal of all wall and ceiling finishes, A/C units in affected rooms, cavity insulation, carpet, ceiling tiles and affected concrete slabs will be required in the building to expose the framing members for the purposes of removing soot from the porous wood

materials. Soot in open conduit and CMU wall cavities will require removal and replacement of the wiring and CMU.

II. Qualifications

A. I have approximately 35 years of experience in the building failure analysis, estimating, project management, forensic building inspections and construction industry. My qualifications are summarized in my Curriculum Vitae (CV), which was provided with this report. Since 2004 I have owned FBS and as principal of FBS, I have conducted on-site inspections and evaluations (both non-invasive and destructive) of foundation assemblies, wall assemblies, curtain and storefront walls, soffit assemblies and attic/roof assemblies to evaluate as-built conditions and determine causation for damages to these various assemblies. I have conducted water and air infiltration testing and negative and positive air pressure testing and evaluations on buildings. I have conducted numerous fire loss investigations and collected air, swab and bulk microbial and soot samples. Preparing project specific repair scopes and unit price estimates as well as obtaining and reviewing bids from licensed contractors are also part of my duties. These projects have included both construction defect cases and properties damaged by other means, including fires. As a licensed building code official I have specific training in the design, construction and inspection of fire rated assemblies.

III. Compensation

A. FBS is reimbursed on both a fixed price and an hourly basis.

B. FBS's costs to inspect the property, collect samples, review reports and estimates and produce this report was **$7,500.00.** My hourly rate is **$350.00** for any additional time spent investigating, providing rebuttal reports, and testifying at depositions and trial. I am also compensated for travel and lodging expenses.

IV. Basis for Opinions and Methodology, Data and Other Information Considered.

The basis for my opinions includes my background, training and 35 years of experience in construction and forensic investigation as well as:

A. The FBS site inspection of the property. The site inspection occurred on July 8, 2015. The inspection was performed by James Wille Irmiter and Adam Piero.

B. I have reviewed the following materials:

1. Estimate Breakstone Restoration
2. Proof of Loss Statement
3. York Statement of Loss
4. Information from County Web site
5. International Building Code, 2006
6. International Energy Conservation Code 2006
7. International Existing Building Code 2006
8. NFPA Life safety Code and Handbook 2015
9. ASTM D6602-13 Standard Practice for Sampling and Testing of Possible Carbon Black Fugitive Emissions or Other Environmental Particulate, or Both

10. ASTM D4840 Guide for Sample Chain-of-Custody Procedures
11. N.G. Carlson Analytical, Inc. Lab Report dated April 28, 2015
12. American Industrial Hygiene Association (AIHA) , The Industrial Hygienists Guide to Indoor Air Quality Investigations, (1992)
13. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE); Thermal Environmental Conditions for Human Occupancy - ASHRAE Standard (ANSI/ASHRAE 55-2008) (2008)
14. Centers for Disease Control (CDC), National Center for Environmental Health (NCEH) Website:www.cdc.gov/nceh/
15. Department of Energy (DOE) Handbook: Fire Protection Volume II Fire Effects on Electrical and Electronic Equipment, DOE-HDBK-1062-96, August 1996.
16. Drysdale, D. "An Introduction to Fire Dynamics" Wiley and Sons, 1985.
17. Environmental Protection Agency (EPA), website, www.epa.gov.
18. Institute for Inspection, Cleaning and Restoration Certification (IICRC),website.ww.iicrc.org/consumers/ care/fire-smoke-restoration
19. National Air Duct Cleaners Association (NADCA) ACR 2005 - Assessment, Cleaning and Restoration 2005
20. New York City Department of Health (NYCDH), "Exposure to Smoke from Fires" (accessed October10, 2013), www.ny.gov.
21. National Institute of Environmental Health Sciences (NIEHS), website, www.niehs.nih.gov.
22. National Institute for Occupational Safety and Health (NIOSH) website: www.niosh.gov.
23. ANSI/UL 723, Standard for Test for Surface Burning Characteristics of Building Materials, 2008, Revised 2010.
24. ANSI/FM 4880, American National Standard for Evaluating Insulated Wall or Wall and Roof/Ceiling Assemblies, Plastic Interior Finish Materials, Plastic Exterior Building Panels, Wall/Ceiling Coating Systems, Interior or Exterior Finish Systems, 2007.
25. NFPA 921, Guide for Fire and Explosion Investigations, 2014 edition.

C. Furthermore, I have conferred with others at FBS which is reasonable and customary in the industry to consider expert reports, opinions and recommendations as to the nature, scope and reparability of damages in preparing estimates of the cost to repair and to replace such damages.

V. Knights Inn

A. Building Codes and Building Design

Building Codes and Standards protect buildings of all types for damages caused by fires. Section **3.3.26 of the NFPA Life and Safety Code defines the exposed open areas and partitioned areas in a structure two ways:**

3.3.26 Atmosphere.

3.3.26.1 ***Common Atmosphere.*** The atmosphere that exists between rooms, spaces, or areas within a building that are not separated by an approved smoke barrier. (SAF-END)

3.3.26.2 ***Separate Atmosphere.*** The atmosphere that exists between rooms, spaces, or areas that are separated by an approved smoke barrier. (SAF-END).

Based on my training as a code official The Knights Inn is defined as a "Common Atmosphere" area and as such is more vulnerable to damage from soot and smoke than a "Separate Atmosphere Area" as defined by the fire codes. There are no smoke barriers in this complex. In our opinion, proper scopes of repairs after a fire loss must first establish if the movement of soot and smoke in a building is possible, from one part of the building to another based on design and conditions.

These Life and Safety portions of the Building Codes are intended to accomplish four things:

1. Save occupant lives
2. Save Firefighters lives during the fire extinguishing process
3. Save or salvage parts of the structure that are not at the cause and origin location of the fire
4. Protect surrounding building from fire spread.

Limiting the spread of fires is accomplished by various methods including:

- Use of fire retardant building materials
- Unit fire separation walls
- Fire rated floors and ceiling assemblies
- Fire suppression systems
- Individual components within the floor, wall and ceiling assemblies which are designed to "block" fire spread
- Building separation distances known as setbacks

Little if anything in fire design addresses the spread of smoke and soot either within the structure itself when the cause and origin is inside the structure, or when the fire surrounds but does not consume the structure or part of it. Typical Life and Safety code requirements are designed to save lives and building, but do not address soot deposition during and after a fire.

Many building products that face outward to the fire or are exposed to the smoke and soot from the fire have surfaces that are less porous due to installation of wall coverings and paints onto these exposed surfaces. The backside facing of these materials is typically unfinished and in a "raw" condition. For example, Gypsum wallboard, insulation, and unfinished plaster and wood lath, carpet, carpet pad, Hollow core doors and ceiling tiles are very porous and more susceptible to infiltration of smoke and soot into the porous material.

Every structure has, as part of its intended design or develops from use, open bypasses that allow for movement of air both from the inside to the outside, commonly called exfiltration, and to

outside in movement commonly called infiltration. These openings are often put through fire separation walls either at the time of construction or after [Example See Figure 47 photo report]. While energy codes address these locations as concerns for loss of heat in the colder climates and loss of cool air in warmer climates, most of the focus is on the outside envelope, not the interior walls and how these communicate with ceilings, and floors through a building. This open communication between these various assemblies often lead to smoke and soot exposure in these cavities after a fire event. In older structures where changes in use and remodeling efforts have taken place over a number of years this can often lead to catastrophic losses due to deposition of carcinogenic soot into walls, floors and ceilings hundreds of feet away from the cause and origin of a fire.

B. Sampling Discussion

FBS conducted air sampling in wall and ceiling cavities along with open room ambient air samples in rooms where cavity sampling took place. In addition, we used bulk sampling and sterilized swabs as additional techniques to verify and cross check with the air sampling. Sampling conducted by FBS located the presence of residual soot in the ambient air in the room samples. In addition, soot was found in walls, ceilings and floor assemblies as well as conduit, and CMU block cavities.

Typically, in post fire remediation strategies recommended by fire restoration companies and insurance companies, walls, ceilings and floors that do not show signs of actual fire damage [e.g. char, physically burned materials] are left in place and either surfaced cleaned or repainted. Post remediation complaints from building occupants often include descriptions of a "lingering smoke smell" months and years later, particularly when large variations in temperature and humidity occur. Soot left in these cavities is "recharged" by this increase in water vapor drive from the humidity causing the smell to present.

FBS collected 25 indoor samples at the KNIGHTS INN ON JULY 8, 2015. The primary purpose of the sample collection was to determine whether or not smoke soot consistent with the reported fire event is in the wall and floor cavities, wire chase ways and other open bypass areas and assist in developing recommendations for repairs.

All of the air samples were collected with an air sampling pump calibrated to run at a volume of 15 liters per minute. The sample duration varied by location. The air samples were collected with Air-O-Cell sampling cassettes.

The ambient air samples were collected for a three to five minute sample period to use for comparison purposes.

The swab samples were collected in wall, floor or ceiling cavities and at conduit and mechanical chase ways. Sealed and sterilized swabs were used for each sample and they were placed within their own individual tubes to prevent any cross-contamination. One sterilized sampling tube was used for each sample then discarded to prevent any cross-contamination.

The sample locations were chosen based on my training education and experience and the site specific inspections and similar projects with similar failure mechanisms. All of the samples were collected and entered into a sample chain of custody. After the sampling was completed,

the samples were delivered to Neil Carlson, CIH, of NG Carlson Analytical. The analysis of the results are included in the report from him.

In addition to the sample chain of custody, the locations of all the samples were written down in a site log book so that the information can be more easily viewed.

VI. Soot Analysis and Interpretation

A. RE: Knights Inn 1121 9th Avenue SW. Bessemer, AL 35023. Samples taken by Jim Irmiter and Adam Piero on 7/08/2015. Samples received 7/20/2015. Samples analyzed 7/25/2015.

Air-O-Cell Samples (7/08/2015)

Location (description from chain of custody)	Fungal particles/ cubic meter	Primary Particles	Notes
1- Ambient air, room 170 (fire origin) 75 liters	850 Heavy Trace	**Heavy Char** most (>5 microns) Cladosporium spp. (37) Basidiospores (11) Asp/Pen like (3) Ganoderma spp. (2) Ascospores (2) Pithomyces spp. (2) Other fungal (7) Insect parts	

2– Interior wall bedroom, room 162 (22.5 liters)	5,550 Heavy trace	Light soot most (>5 microns) Moderate char most (>5 microns) **Asp/Pen like (54)** Stachybotrys spp. (2) Basidiospores (2) Ganoderma spp. (2) Ascomycetes (2) Pithomyces spp. (2) Cladosporium spp. (2) Other fungal (59) Sheetrock dust	
4– Interior wall bedroom, room 164 (22.5 liters)	<50 Very Light trace	Light soot and char (most >5 microns)	Fungal spores not noted
5– Interior wall vanity room 176 (22.5 liters)	220 Light trace	Light soot and char (most >5 microns) **Stachybotrys spp. (3)** Fungal fragment (1) Insect parts (1)	

6 - Interior wall bedroom, room 178 (22.5 liters)	270 Light trace	Light soot most (>5 microns) Asp/Pen like (4) Cladosporium spp. (2)	
7 – Ambient air bedroom 181 (75 liters)	27 Light trace	Light soot most (>5 microns) Asp/Pen like (2)	
8 – Interior wall bedroom, room 181 (22.5 liters)	59,500* Heavy trace	Moderate soot most (>5 microns) Light char most (>5 microns **Asp/Pen like (1,239)*** Stachybotrys spp. (1) Chaetomium spp. (1) Ascospores (1) Cladosporium spp. (1) Other (96)* Insect parts	
9 – Interior wall conduit line, room 107 (30 liters)	1,670 Moderate trace	Light soot most (>5 microns) Cladosporium spp. (26) Asp/Pen like (14) Basidiospores (7) Ascospores (3)	

10 – Interior CMU wall bedroom, room 110 (30 liters)	1,100 Light trace	Light char and soot most (>5 microns) Asp/Pen like (9) Ganoderma spp. (1) Curvularia spp. (1) Chaetomium spp. (2) Urediniospores (1) Other fungal spores (11)	
12 – Interior wall bedroom, room 115 (22.5 liters)	15,300 Moderate trace	Light soot most (>5 microns) Cladosporium sphaerospermum (**234**) **Asp/Pen like (42)** Cladosporium spp. (27) Basidiospores (16) **Chaetomium spp. (4)** **Stachybotrys spp. (4)** Other fungal spores (14)	

13 – Interior wall bedroom, room 120 (22.5 liters)	6,000 Very Heavy trace	Light soot and char (>5 microns) Very heavy sheetrock dust **Asp/Pen like (64)** Cladosporium sphaerospermum **(35)** **Stachybotrys spp. (9)** Fungal fragment (3) Other (24) Insect fecal pellets	
14 – Interior wall bedroom, room 216 (22.5 liters)	2,000 Light trace	Very light soot Asp/pen (14) **Stachybotrys spp. (12)** **Chaetomium spp. (5)** Ascospores (4) Basidiospores (3) Cladosporium spp. (2) Ganoderma spp. (1) Fungal fragment (4)	

15 – Bathroom vent, Room 212, 30 liters	500 Light trace	Light soot and char Cladosporium spp. (13) Basidiospores (1) Other fungal spores (1)	
16 – Ambient Air, room 210, 75 liters	30,000* Heavy trace	Light soot and char **Asp/Pen like (1,165)*** Cladosporium spp.(220)* **Stachybotrys spp. (190)** **Chaetomium spp. (68)*** Fungal fragments (80)* Ascospores (30)* Wallemia like (20) Alternaria spp. Bipolaris like Other fungal spores (535) Insect parts+50+80+68+190+220+1165	

19 - Interior wall vanity room , Room 262, 22.5 liters	98,000* Heavy trace	Light soot and moderate char **Asp/Pen like (1895)*** Basidiospores (80)* Wallemia like (34) **Stachybotrys spp. (31)** **Chaetomium spp. (6)** Fungal fragments (80)* Ascospores (30)* Ganoderma spp. Alternaria spp. Epicoccum spp. Torula spp. Other fungal spores (80)* Insect parts	
20 - Interior wall bathroom, 268, 22.5 liters	No analysis	Sample not available	

21 – Interior wall bedroom, Room 277, 22.5 liters	10,400* Heavy trace	Light soot and char Sheetrock dust **Asp/Pen like (50)*** Cladosporium spp.(10) Basidiospores (60)* Stachybotrys spp. (1) **Chaetomium spp. (4)** Ascospores Fungal fragments (35)* Ascospores Other fungal spores (85)* Insect parts	
22 – Interior wall bathroom, 280, 22.5 liters	490 Light trace	Light soot and char **Stachybotrys spp. (7)** Cladosporium spp. (2) Ascospores (2)	

23 – Expansion Joint, NW side, 30 liters	93,000* Heavy trace	**Heavy soot** & light char some >5 microns **Cladosporium spp.(1480)*** **Asp/Pen like (650)*** Stachybotrys spp. (1) Chaetomium spp. (1) Epicoccum spp. Fungal fragments Ascospores Other fungal spores Insect parts (heavy)	
25 – Expansion Joint, SE side, 30 liters	1,200	Heavy soot & char some < 5 microns Cladosporium spp.(15) Stachybotrys spp. (1) Fungal fragments Other fungal spores (20) Pine pollen Plant stellate hairs (heavy) Insect parts (heavy)	

Swab and bulk samples (7/8/2015)

Location (description from chain of custody)	Fungal growth	Primary Particles	Notes
3 – Corrugated metal ceiling, room 162, bedroom	++++	Light soot and char **Fungal mycelia** (no id)	Fungal growth
11 – Insulation in bedroom, room 110	0	Moderate soot on the insulation	No fungal growth
17 – Bathroom vent, Room 210	+++	Asp/Pen like Light char	Fungal growth in patches
18 – Ceiling Joist, Room 210	++++	**Penicillium spp.**	Fungal growth
24 – Expansion Joint, NE side	++++	Moderate soot (> 5 microns) **Fungal mycelia** – No id	Fungal growth
26 – Expansion Joint, SW side	++++	Light soot (Most >5 microns) **Alternaria spp.** **Asp/pen like**	Fungal growth

Interpretation – variation on IICRC – standard

0	No fungal growth noted
+	Normal spore deposition – no growth
++	Elevated spore deposition – no growth
+++	Patches of fungal growth
++++	Heavy fungal growth

Standard Definitions:

* Due to high count or heavy trace this number is an estimate.
Cu. Meter- Cubic meter
IICRC – S520 Standard and Reference Guide for Professional Mold Remediation (2008)
sp. and spp. – The "sp." is an abbreviation for "species." It is used when the actual species name cannot or is not specified. The plural form of this abbreviation is "spp." and indicates several species.

B. Description of Soot

Definition of Soot:

Soot is a general term that refers to the black, impure carbon particles resulting from the incomplete combustion of a hydrocarbon. It is more properly restricted to the product of the gas-phase combustion process but is commonly extended to include the residual pyrolyzed fuel particles such as cenospheres, charred wood, petroleum coke, etc. that may become airborne during pyrolysis and which are more properly identified as cokes or chars. The gas-phase soots contain polycyclic aromatic hydrocarbons (PAHs). The PAHs in soot are known mutagens and probable human carcinogens. Soot is in the general category of airborne particulate matter, and as such is considered hazardous to the lungs and general health. Soot is classified as a "Known Human Carcinogen" by the International Agency for Research on Cancer (IARC).[i]

C. The Impact of Soot in Hidden Cavities on Building Occupants

Soot and or char was found in all 19 air samples and in 5 out of six swab samples. This represents that 96% of the samples were confirmed positive for soot consistent with the fire event. In addition high levels of **Stachybotrys, Chaetomium** and **Asp/Pen were found.** These molds are consistent with heavier water events. Ambient samples taken in open areas all had soot in the ambient air. Based on our field investigations and soot sampling in wall cavities, soot from the fire was freely deposited throughout Knights Inn during the initial fire event and continues to be aerosolized in the ambient air. Movement of soot and cross contamination is caused by the general porous nature of the building envelope and the lack of proper initial remediation. In our opinion, any remediation efforts undertaken to date will need to be redone and have no value.

Based on the age and condition of the building at the time of the loss, transfer of air from one part of the building affects every part of the building at this loss location. The number of open bypasses between floors, ceilings and walls is innumerable.

According to the Environmental Protection Agency:
"The actual composition of smoke generated during a given event is dependent on the type of fuel; different materials produce different compounds when burned (New York City Department of Health, NYCDH and University of Washington, UofW). Particulate matter deposited by smoke is mostly comprised of carbon (soot). The tiny particles in smoke do get inside structures. "If smoke levels are high for a prolonged period of time, these particles can build up indoors." (EPA, US Forest Service)."[ii] In our opinion, this occurred at over 84% of the locations sampled at this site.

"The odors which result from smoke can linger long after the immediate hazard of the fire and the smoke plume. This odor can cause nausea and headaches, respiratory issues, as well as an overall sense of annoyance at the constant smoke irritation for people. The lingering odor persists due to tiny microscopic particles that cling to the available surfaces (walls, furniture, floors, clothing, etc.) (TAMU)."[iii]

VII. Conclusions

Soot was found in over 96% of the samples taken in wall and ceiling assemblies at the Knights Inn Complex. The Unit separations expansion joint location also contained soot. The type of open construction with numerous bypasses in the building continues to move the soot throughout the building. We attribute the large mass of smoke and soot deposition into the adjacent areas away from the fire to the type of construction in place at the time of the loss. Open bypasses, and common partition walls that were open to floor and ceiling assemblies allowed the smoke and particulate soot to freely distribute into these cavities effecting virtually 100% of the building.

Damage to the Concrete slab and metal deck at the cause and origin locations will require removal and replacement of these replacements. Shoring will be required during the removal and replacement of the CMU walls.

Based on the results of the sampling, all interior finishes and cavity insulation should be removed to expose the framing for cleaning and/or removal. All bath fan and appliance ducting must be removed and replaced. All through wall AC units in affected rooms must be removed. All conduit with any open bypass in the conduit must be replaced. All CMU separation walls must be blocked off and sealed or removed. After completion of cleaning and material removal, additional clearance sampling should be done to verify that soot has been removed prior to installation of any mechanical, framing or insulation and final finishes.

Lastly, failure to remove the soot from the hidden cavities will expose future workers to exposure during future renovations and remodeling efforts.

VIII. Scope of Repair

Based on our sampling results and inspection observations the following repairs should be performed:

A. Interior:

1. Interior trim, wall floor and ceiling materials including wall cavity insulation should be removed and replaced in all rooms that have exhibited soot contamination.
2. All exposed steel and wood framing, metal roof decking, and brick should be HEPA vacuumed. Exposed framing, metal decks, concrete and CMU materials that are not removed should be sprayed with a disinfectant. This includes all floor assemblies.
3. All AC units in affected rooms should be replaced.
4. All motorized pumps and blower fans should be replaced.
5. Secondary sampling for clearance prior to rebuild should be completed.

Forensic Building Science's opinions and recommendations are made without regard to coverage. The Insurance Carrier determines coverage and any issues related to coverage are the responsibility of the Insured and the Carrier. Discovery is ongoing. Additional testing and inspections may need to be performed and additional and/or supplemental information and opinions may be contained in future reports issued by Forensic Building Science, Inc. This report is the exclusive property of the client noted previously and cannot be relied upon by a third party. Copies of this report are released to third parties only by written permission of the client.

Thomas Irmiter, Forensic Building Science, Inc.

August 10, 2015
Dated:

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[i] Reference

US Department of Health and Human Services. Public Health Service, National Toxicology Program. Report on Carcinogens, Twelfth Edition. 2011. Accessed at http://ntp.niehs.nih.gov/ntp/roc/twelfth/roc12.pdf on June 14, 2011.

[ii] Armstrong Analytical